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A positron lifetime analysis probe for deeply occurring defects. T. COWAN and R. HOWELL, Lawrence Livermore National Laboratory -- A new lifetime analysis tool is being developed at Lawrence Livermore National Laboratory for the analysis of defects well below the surface of single sample specimens. This deep defect probe is based on a 1 to 3 MeV positron beam derived from a thermal positron flux obtained from a 100mCi radioactive source and moderator foil placed in the terminal of a 3MV pelletron electrostatic accelerator. Positron lifetime analysis is performed using a thin plastic detector to clock the positron arrival and a barium fluoride detector to detect annihilation gamma rays. This instrument has several advantages over conventional source-sandwich lifetime experiments. The higher detection efficiency leads to a higher sample throughput. A significant easing of sample geometry enables measurements of finished, bulky parts. There is lower charge deposition during analysis in insulating samples. Also due to the penetrating nature of the positron beam we can measure samples that are encapsulated and perform measurements in insitu environments of temperature or atmosphere. Details of the operation of the instrument and sample data will be presented. This work was performed under the auspices of the U.S. Department of Energy by LLNL under contract No. W-7405-ENG-48.